

What is claimed is:

1. A method of forming a gate dielectric on a transistor body region, comprising:
evaporating Al₂O₃ at a first rate;
evaporating La₂O₃ at a second rate; and
controlling the first rate and the second rate to provide a film containing LaAlO₃ on the transistor body region.
2. The method of claim 1, wherein evaporating Al₂O₃ and evaporating La₂O₃ includes evaporating dry pellets of Al₂O₃ and La₂O₃.
3. The method of claim 1, wherein evaporating La₂O₃ includes evaporating La₂O₃ by electron beam evaporation.
4. The method of claim 1, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.
5. The method of claim 4, wherein selectively providing a film composition having a predetermined dielectric constant includes providing a film composition with a dielectric constant ranging from the dielectric constant of an Al₂O₃ film to the dielectric constant of a La₂O₃ film.
6. The method of claim 1, wherein controlling the first rate and the second rate to provide a film containing LaAlO₃ includes providing an amorphous LaAlO₃ film.
7. The method of claim 1, wherein evaporating La₂O₃ begins substantially concurrent with beginning evaporating Al₂O₃.

8. The method of claim 1, wherein evaporating Al_2O_3 and evaporating La_2O_3 includes depositing LaAlO_3 on the transistor body region in a base pressure lower than about 5×10^{-7} Torr and in a deposition pressure lower than about 2×10^{-6} Torr.
 9. The method of claim 1, further including annealing the transistor body region after providing the film containing LaAlO_3 .
 10. The method of claim 9, wherein annealing the transistor body region after providing the film containing LaAlO_3 includes annealing in N_2 .
 11. The method of claim 10, wherein annealing in N_2 includes annealing in an electric furnace at about 700°C .
 12. The method of claim 10, wherein annealing in N_2 includes annealing in RTA in the range from about 800°C to about 900°C .
 13. A method of forming a gate dielectric on a transistor body region, comprising:
 - evaporating Al_2O_3 at a first rate using a first electron gun;
 - evaporating La_2O_3 at a second rate using a second electron gun; and
 - controlling the first rate and the second rate to provide a film containing LaAlO_3 on the transistor body region.
 14. The method of claim 13, wherein evaporating Al_2O_3 and evaporating La_2O_3 includes evaporating dry pellets of Al_2O_3 and La_2O_3 .
 15. The method of claim 13, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.

16. The method of claim 15, wherein selectively providing a film composition having a predetermined dielectric constant includes providing a film composition with a dielectric constant ranging from the dielectric constant of an Al₂O₃ film to the dielectric constant of a La₂O₃ film.
17. The method of claim 13, wherein controlling the first rate and the second rate to provide a film containing LaAlO₃ includes providing an amorphous LaAlO₃ film.
18. The method of claim 13, wherein evaporating La₂O₃ begins substantially concurrent with beginning evaporating Al₂O₃.
19. The method of claim 13, wherein forming the gate dielectric includes growing the film containing LaAlO₃ at a growth rate in the range from about 0.5 nm/min to about 50 nm/min.
20. The method of claim 13, further including annealing the transistor body region after providing the film containing LaAlO₃.
21. A method of forming a gate dielectric on a transistor body region, comprising:
 - evaporating Al₂O₃ at a first rate using a first electron gun;
 - evaporating La₂O₃ at a second rate using a second electron gun;
 - controlling the first rate and the second rate to provide a film containing LaAlO₃ on the transistor body region; and
 - annealing in N₂ after providing the film containing LaAlO₃ on the transistor body region.
22. The method of claim 21, wherein evaporating Al₂O₃ and evaporating La₂O₃ includes evaporating dry pellets of Al₂O₃ and La₂O₃.

23. The method of claim 21, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.
24. The method of claim 21, wherein controlling the first rate and the second rate to provide a film containing LaAlO₃ includes providing an amorphous LaAlO₃ film.
25. The method of claim 21, wherein evaporating La₂O₃ begins substantially concurrent with beginning evaporating Al₂O₃.
26. The method of claim 21, wherein evaporating Al₂O₃ and evaporating La₂O₃ includes depositing LaAlO₃ on the transistor body region in a base pressure lower than about 5x10⁻⁷ Torr and in a deposition pressure lower than about 2x10⁻⁶ Torr.
27. The method of claim 21, wherein annealing in N₂ includes annealing in an electric furnace at about 700°C.
28. The method of claim 21, wherein forming the gate dielectric includes growing the film containing LaAlO₃ at a growth rate in the range from about 0.5 nm/min to about 50 nm/min.
29. A method of forming a transistor, comprising:
 - forming first and second source/drain regions;
 - forming a body region between the first and second source/drain regions;
 - evaporating Al₂O₃ at a first rate;
 - evaporating La₂O₃ at a second rate;
 - controlling the first rate and the second rate to provide a film containing LaAlO₃ on the body region; and
 - coupling a gate to the film containing LaAlO₃.

30. The method of claim 29, wherein evaporating Al₂O₃ and evaporating La₂O₃ includes evaporating dry pellets of Al₂O₃ and La₂O₃.
31. The method of claim 29, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.
32. The method of claim 29, wherein selectively providing a film composition having a predetermined dielectric constant includes providing a film composition with a dielectric constant ranging from the dielectric constant of an Al₂O₃ film to the dielectric constant of a La₂O₃ film.
33. The method of claim 29, wherein controlling the first rate and the second rate to provide a film containing LaAlO₃ includes providing an amorphous LaAlO₃ film.
34. The method of claim 29, wherein evaporating La₂O₃ begins substantially concurrent with beginning evaporating Al₂O₃.
35. A method of forming a memory array, comprising:
forming a number of access transistors, comprising:
 forming first and second source/drain regions;
 forming a body region between the first and second source/drain regions;
 evaporating Al₂O₃ at a first rate;
 evaporating La₂O₃ at a second rate;
 controlling the first rate and the second rate to provide a film containing LaAlO₃ on the body region. ; and
 coupling a gate to the film containing LaAlO₃;

forming a number of wordlines coupled to a number of the gates of the number of access transistors;

forming a number of sourcelines coupled to a number of the first source/drain regions of the number of access transistors; and

forming a number of bitlines coupled to a number of the second source/drain regions of the number of access transistors.

36. The method of claim 35, wherein evaporating Al₂O₃ and evaporating La₂O₃ includes evaporating dry pellets of Al₂O₃ and La₂O₃.

37. The method of claim 35, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.

38. The method of claim 37, wherein selectively providing a film composition having a predetermined dielectric constant includes providing a film composition with a dielectric constant ranging from the dielectric constant of an Al₂O₃ film to the dielectric constant of a La₂O₃ film.

39. The method of claim 35, wherein forming the gate dielectric includes growing the film containing LaAlO₃ at a growth rate in the range from about 0.5 nm/min to about 50 nm/min.

40. A method of forming an information handling system, comprising:

forming a processor;

forming a memory array, comprising:

forming a number of access transistors, comprising:

forming first and second source/drain regions;

forming a body region between the first and second source/drain regions;

evaporating Al₂O₃ at a first rate;

evaporating La₂O₃ at a second rate;

controlling the first rate and the second rate to provide a film containing LaAlO₃ on the body region. ; and

coupling a gate to the film containing LaAlO₃;

forming a number of wordlines coupled to a number of the gates of the number of access transistors;

forming a number of sourcelines coupled to a number of the first source/drain regions of the number of access transistors;

forming a number of bitlines coupled to a number of the second source/drain regions of the number of access transistors; and

forming a system bus that couples the processor to the memory array.

41. The method of claim 40, wherein evaporating Al₂O₃ and evaporating La₂O₃ includes evaporating dry pellets of Al₂O₃ and La₂O₃.

42. The method of claim 40, wherein evaporating La₂O₃ and evaporating Al₂O₃ includes evaporating La₂O₃ and evaporating Al₂O₃ by electron beam evaporation.

43. The method of claim 40, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.

44. A transistor, comprising:

a first and second source/drain region;

a body region located between the first and second source/drain regions;

a dielectric layer containing LaAlO₃ coupled to a surface portion of the body region between the first and second source/drain regions, the dielectric layer including Al₂O₃, or La₂O₃; and
a gate coupled to the dielectric layer.

45. The transistor of claim 44, wherein the dielectric layer includes Al₂O₃, and La₂O₃.
46. The transistor of claim 44, wherein the dielectric layer is substantially amorphous.
47. The transistor of claim 44, wherein the dielectric layer exhibits a dielectric constant in the range from about 21 to about 25.
48. The transistor of claim 44, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) in the range from about 1.5 Angstroms to about 5 Angstroms.
49. The transistor of claim 44, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) of less than 3 Angstroms.
50. A memory array, comprising:
a number of access transistors, comprising:
a first and second source/drain region;
a body region located between the first and second source/drain regions;
a dielectric layer containing LaAlO₃ coupled to a surface portion of the body region between the first and second source/drain regions, the dielectric layer including Al₂O₃, or La₂O₃; and
a gate coupled to the dielectric layer;
a number of wordlines coupled to a number of the gates of the number of access transistors;

a number of sourcelines coupled to a number of the first source/drain regions of the number of access transistors; and

a number of bitlines coupled to a number of the second source/drain regions of the number of access transistors.

51. The memory array of claim 50, wherein the dielectric layer includes Al₂O₃, and La₂O₃.

52. The memory array of claim 50, wherein the dielectric layer is substantially amorphous.

53. The memory array of claim 50, wherein the dielectric layer exhibits a dielectric constant in the range from about 21 to about 25.

54. The memory array of claim 50, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) in the range from about 1.5 Angstroms to about 5 Angstroms.

55. The memory array of claim 50, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) of less than 3 Angstroms.

56. An information handling device, comprising:

a processor;

a memory array, comprising:

a number of access transistors, comprising:

a first and second source/drain region;

a body region located between the first and second source/drain regions;

a dielectric layer containing LaAlO₃ coupled to a surface portion of the body region between the first and second source/drain regions, the dielectric layer including Al₂O₃, or La₂O₃; and

a gate coupled to the dielectric layer;

a number of wordlines coupled to a number of the gates of the number of access transistors;

a number of sourcelines coupled to a number of the first source/drain regions of the number of access transistors;

a number of bitlines coupled to a number of the second source/drain regions of the number of access transistors; and

a system bus coupling the processor to the memory device.

57. The information handling device of claim 56, wherein the dielectric layer includes Al₂O₃, and La₂O₃.

58. The information handling device of claim 56, wherein the dielectric layer is substantially amorphous.

59. The information handling device of claim 56, wherein the dielectric layer exhibits a dielectric constant in the range from about 21 to about 25.

60. The information handling device of claim 56, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) in the range from about 1.5 Angstroms to about 5 Angstroms.

61. The information handling device of claim 56, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) of less than 3 Angstroms.

62. A transistor formed by the process, comprising:
forming a body region coupled between a first source/drain region and a second source/drain region;
evaporating Al_2O_3 at a first rate;
evaporating La_2O_3 at a second rate;
controlling the first rate and the second rate to provide a film containing LaAlO_3 on the body region; and
coupling a gate to the film containing LaAlO_3 .
63. The transistor of claim 62, wherein evaporating Al_2O_3 and evaporating La_2O_3 includes evaporating dry pellets of Al_2O_3 and La_2O_3 .
64. The transistor of claim 62, wherein evaporating Al_2O_3 and evaporating La_2O_3 includes evaporating Al_2O_3 using a first electron gun and evaporating La_2O_3 using a second electron gun.
65. The transistor of claim 62, wherein controlling the first rate and the second rate includes controlling the first rate and the second rate to selectively provide a film composition having a predetermined dielectric constant.
66. The transistor of claim 62, wherein the dielectric layer exhibits a dielectric constant in the range from about 21 to about 25.
67. The transistor of claim 62, wherein the dielectric layer exhibits an equivalent oxide thickness (t_{eq}) in the range from about 1.5 Angstroms to about 5 Angstroms.